

TWO NEW GENERA AND SIX NEW SPECIES OF LEAFHOPPERS (HEMIPTERA: CICADELLIDAE: CICADELLINAE) FROM HISPANIOLA ¹

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ABSTRACT: Two new genera and six new species related to the genus *Hadria* are described from Hispaniola. *Parahadria* new genus, includes but the type species *P. octolineata* n. sp. *Neohadria* new genus, includes five new species, *N. maculata*, type species, *N. amaurota*, *N. delecta*, *N. diversa*, and *N. grisea*. *Parahadria octolineata* is found commonly throughout the island, while all *Neohadria* species are found only in the higher elevations of the central and western part of the island.

KEY WORDS: Hemiptera, Cicadellidae, Cicadellinae, *Parahadria*, *Neohadria*, *Hadria*, Dominican Republic, Hispaniola

Two new genera closely related to the genus *Hadria* Metcalf and Bruner (1936) are described from Hispaniola. Both genera include species which look much like the species found in *Hadria*, but differ in the number of anteapical cells in the forewing and some differences in the male and female genitalia. Young (1977) included sixteen species in the genus *Hadria* from Cuba and Hispaniola. Dlabola and Novoa (1976a, 1976b) added two species to the genus *Arezzia* Metcalf and Bruner (1936) and two species to the genus *Hadria*. Young (1977) considered *Arezzia* and *Lucumius* Metcalf and Bruner (1936) synonyms of *Hadria*, as all species have two anteapical cells in the forewing. In this paper I accept Young's concept of the genus, so there are about 20 species in the genus *Hadria*. The new genera being described have but one anteapical cell or none, and are only found on Hispaniola. This difference is usually easily seen, so the two new genera are quickly separated from *Hadria*.

The acronyms used for the repositories alluded to in this paper are, as follows: CMNH- Carnegie Museum of Natural History, Pittsburg, Pennsylvania; USNM- National Museum of Natural History, Washington, D.C.; FSCA-Florida State Collection of Arthropods, Gainesville; UKYL-University of Kentucky Collection, Lexington; MHND-Museo Nacional de Historia Natural, Santo Domingo, Dominican Republic.

Key to the species of the *Hadria* complex

1. Forewings with two anteapical cells, either normal sized (Young, 1977, Fig. 790p) or very small (Young, 1977, Fig. 782p), male paraphysis absent, or with one or two processes *Hadria* Metcalf and Bruner
- 1'. Forewings with one anteapical cell (Fig. 4) or none (Fig. 2) 2

¹ Received on August 7, 2006. Accepted on May 17, 2007.

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2. Forewings with one anteapical cell (Fig. 4), male paraphysis reduced to small sclerite (Fig. 1).....*Neohadria* Freytag n. g.
 2'. Forewings with no anteapical cell (Fig. 2), male paraphysis with long thin base and long single process (Fig. 9).....*Parahadria* Freytag n. g.

Parahadria Freytag NEW GENUS

Body: Length 5.9-7 mm. Head moderately produced, ocelli slightly closer to eye than median line. Thorax with pronotal width less than transocular width of head, lateral margins rounded. Forewing with membrane extending over all apical cells, except basal portion of third and outer apical cell, second and third apical cells nearly equal in length, wider at wing margin, with no anteapical cell. Hindleg with femoral setal formula 2:1:1.

Male genitalia: Pygofer moderately produced, apex rounded, macrosetae few located on posterior half. Subgenital plates extending two-thirds length of pygofer, with uniseriate mirosetae. Style small, extending about half length of connective, pointed at apex. Connective T-shaped, long. Aedeagus with shaft short, without processes. Paraphysis present, asymmetrical with a single, long apical process. Female seventh sternum large, rounded at posterior margin, with median slightly produced, bifurcate.

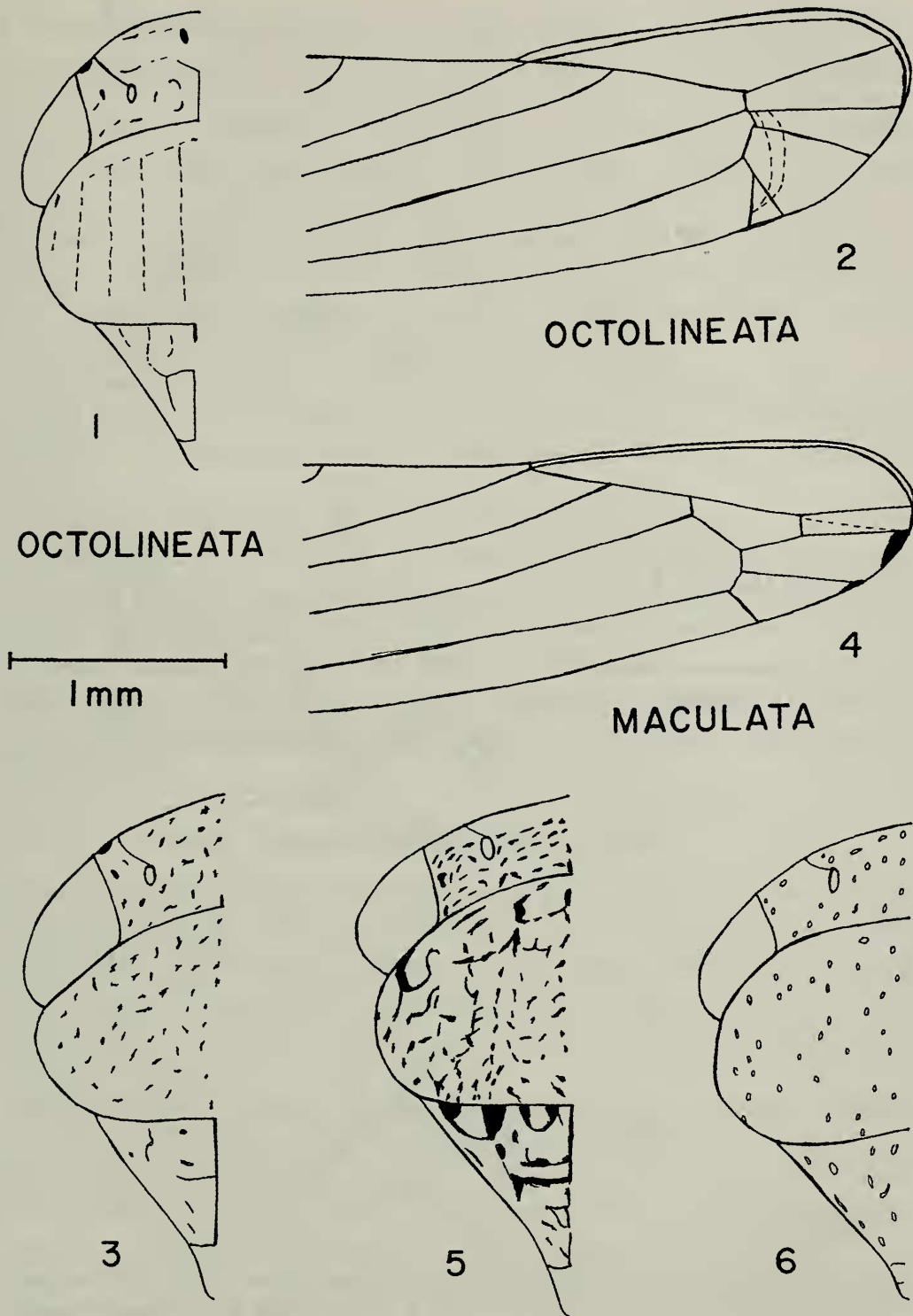
Type species: *Parahadria octolineata* Freytag, n. sp.

Remarks: This genus is close to the genus *Hadria*, but differs from that genus by having no anteapical cell in the forewing, and the male paraphysis has a longer, thinner base than found in any of the *Hadria* species.

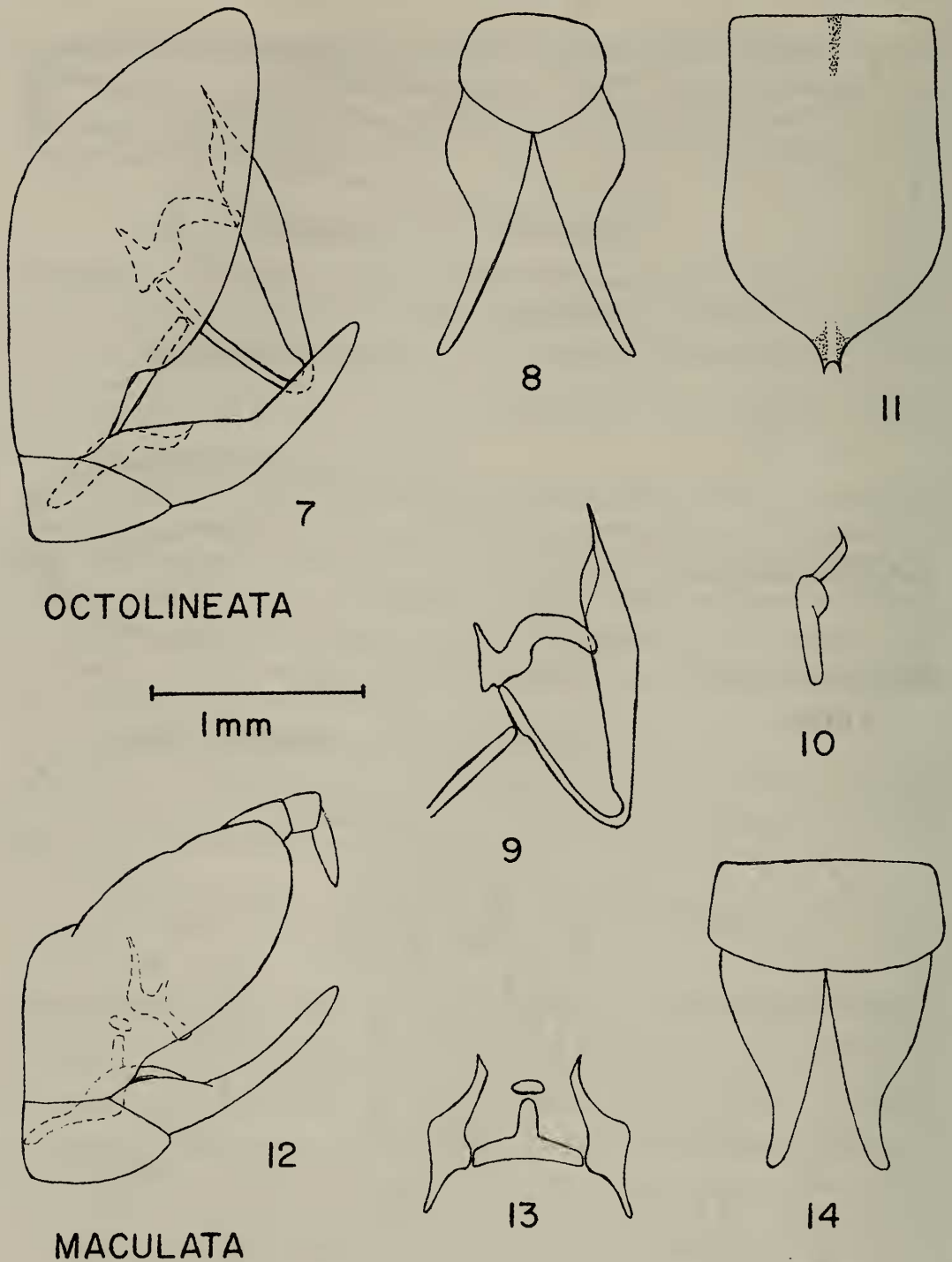
Parahadria octolineata Freytag NEW SPECIES

(Figures 1-2 and 7-11)

Description: Length of male 5.9-6.1 mm, female 6.5-7 mm. Similar to *Hadria maldonadoi* but slightly larger and with a lighter yellow green color. Head yellow with dark brown markings (Fig. 1), with face mostly yellow with median dark brown spot. Pronotum with anterior, yellow, with posterior two-thirds green, marked with eight longitudinal thin lines of black dots (Fig. 1). Scutellum yellow, with brown markings (Fig. 1). Forewings mostly green, with yellow costal area, veins brown; apical cells membranous, except for whitish patch across base of third and fourth cells (Fig. 2). Legs yellow. Abdomen yellow ventrally, dark brown dorsally. Male genitalia: Pygofer rounded at apex (Fig. 7). Subgenital plates with wide base narrowing to thin, rounded apex (Fig. 8), about half length of pygofer. Aedeagus (Fig. 9) short, finger-like, curving ventrally. Connective T-shaped, with long shaft. Paraphysis (Fig. 9) with long narrow base, with single long wide process narrowing near apex which is pointed. Style (Fig. 10) small, narrowing from base to sharply pointed apex. Female seventh sternum (Fig. 11) long, rounded to slightly prolonged median bifurcate apex.



Figures 1-2. *Parahadria octolineata* n. sp. Fig. 1. Dorsal view of head, pronotum and scutellum. Fig. 2. Forewing, apical half. Figures 3-4. *Neohadria maculata* n. sp. Fig. 3. Dorsal view of head, pronotum and scutellum. Fig. 4. Forewing, apical half. Figure 5. *Neohadria diversa* n. sp., dorsal view of head, pronotum and scutellum. Figure 6. *Neohadria amaurota* n. sp., dorsal view of head, pronotum and scutellum. All drawn to the same scale.



Figures 7-14. Figures 7-11. *Parahadria octolineata* n. sp. Fig. 7. Male genital capsule, lateral view, setae not shown. Fig. 8. Male valve and subgenital plates, ventral view, setae not shown. Fig. 9. Male aedeagus, paraphysis and apex of connective, lateral view. Fig. 10. Male style, lateroventral view. Fig. 11. Female seventh sternum, ventral view. Figures 12-14. *Neohadria maculata* n. sp. Fig. 12. Male genital capsule, lateral view, setae not shown. Fig. 13. Male styles, connective and paraphysis, ventral view. Fig. 14. Male valve and subgenital plates, ventral view, setae not shown. All drawn to the same scale.

Type Data: Holotype male: Dominican Republic: Duarte, Reserva Loma Quita Espuela, canelo, 13.1 km NNE San Francisco de Macoris, 19-24-44 N 70-09-47 W, 512 m., 6-IV-2004, C. Young, R. Davidson and J. Rawlins, burned patch in broadleaf forest, uv light, sample 11313 (CMNH). Paratypes: Three males, three females, same data as holotype; 1 male, 2 females, same data as holotype, except 13.2 km, 19-24-46 N 70-09-52 W, 515 m., edge of wet broadleaf forest; and 5 males, 2 females, same data as holotype, except 13.2 km, 19-24-47 N 70-09-54 W, 523 m., disturbed field near wet forest fragment. Nine male, seven female paratypes (CMNH); two male, two female paratypes (FSCA); and two male, two female paratypes (UKYL).

Additional Specimens: Over 600 specimens have been seen from nearly all parts of the Dominican Republic. Over 200 specimens (CMNH), 150 specimens (MHND); 150 specimens (FSCA); 55 specimens (UKYL); and the remainder (USNM).

Remarks: This species is larger than *Hadria maldonadoi*, and with a different color pattern. However, this species was mixed with the specimens Young (1977) had when he described that species. All specimens of *H. omaldonadoi* from the type locality appear to be that species. The other specimens in the series from other localities appear to be *octolineata*. Some of the drawings, such as the wing (Young, 1977, fig. 794p), are also probably of *octolineata*. This species is fairly common throughout the island, while *H. omaldonadoi* is uncommon and rarely collected.

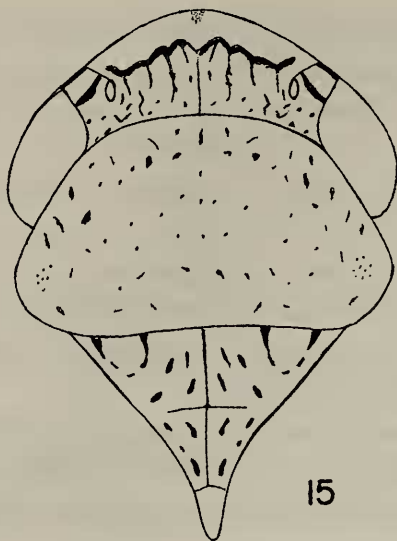
Neohadria Freytag NEW GENUS

Body: Length 6-8.5 mm. Head moderately produced, ocelli closer to eye than median line. Thorax with pronotal width nearly same as transocular width of head, lateral margin rounded. Forewing with membrane extending to second apical cell, except for basal portion of second cell, second apical cell small, parallel sided, shorter than third apical cell, one antepical cell. Hindleg with femoral setal formula 2:1:1.

Male genitalia: Pygofer moderately produced, apex rounded, macrosetae few located on posterior half. Subgenital plates variable, extending nearly to pygofer apex, with uniseriate microsetae. Styles variable, usually with pointed apex. Connective T-shaped, short. Aedeagus with shaft short, without processes. Paraphysis vestigial, represented by small sclerite between connective and aedeagus. Female seventh sternum large, wide, with posterior margin rounded to small sharply pointed median.

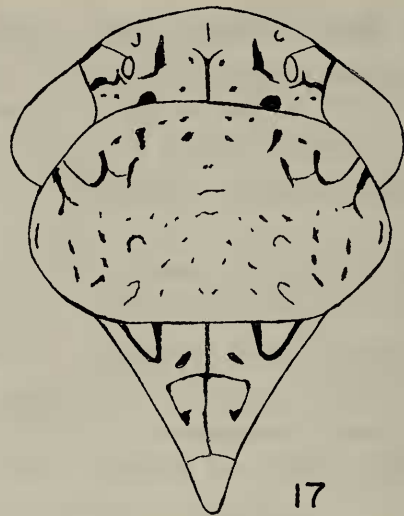
Type species: *Neohadria maculata* Freytag, n. sp.

Remarks: This genus is near the genus *Hadria*, but has only one antepical cell in the forewing, and the male paraphysis is represented by a small sclerite, which is not found in any of the species of *Hadria*.



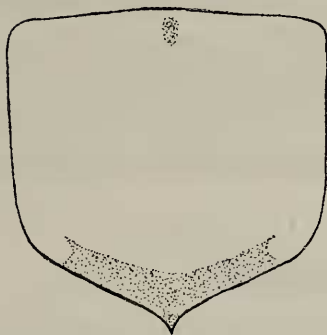
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DELECTA

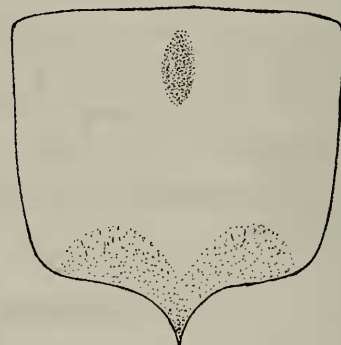
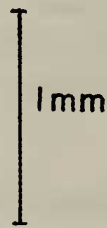


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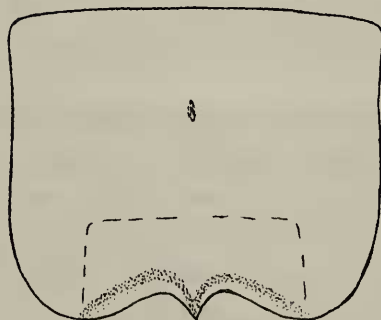
GRISEA



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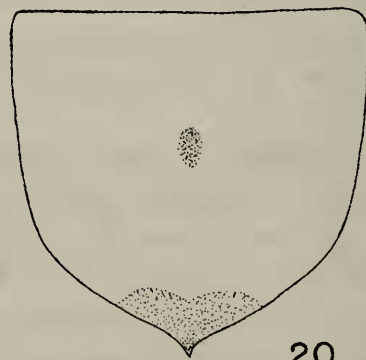


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DIVERSA

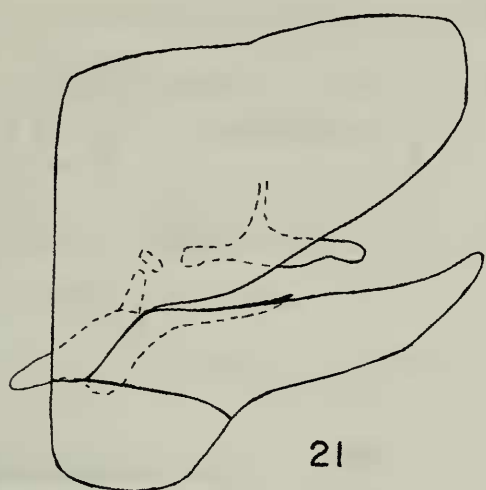
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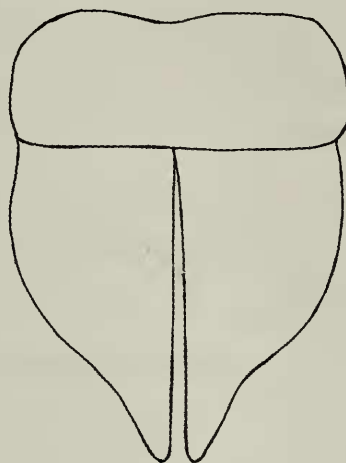
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MACULATA

Figures 15-20. Figures 15-16. *Neohadria delecta* n. sp. Fig. 15. Head, pronotum and scutellum, dorsal view. Fig. 16. Female seventh sternum, ventral view. Figures 17-18. *Neohadria grisea* n. sp. Fig. 17. Head, pronotum and scutellum, dorsal view. Fig. 18. Female seventh sternum, ventral view. Figure 19. *Neohadria diversa* n. sp., female seventh sternum, ventral view. Figure 20. *Neohadria maculata* n. sp., female seventh sternum, ventral view. All drawn to the same scale.

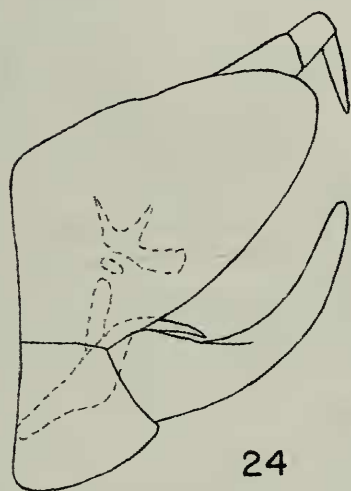


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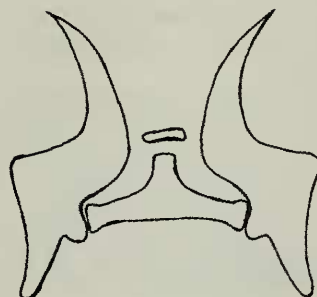
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DIVERSA



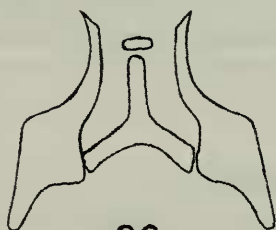
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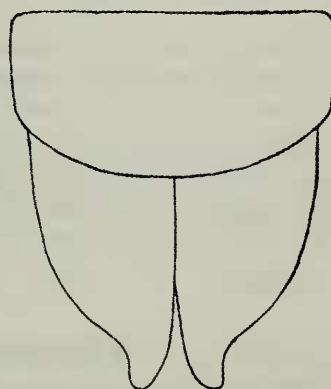


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GRISEA

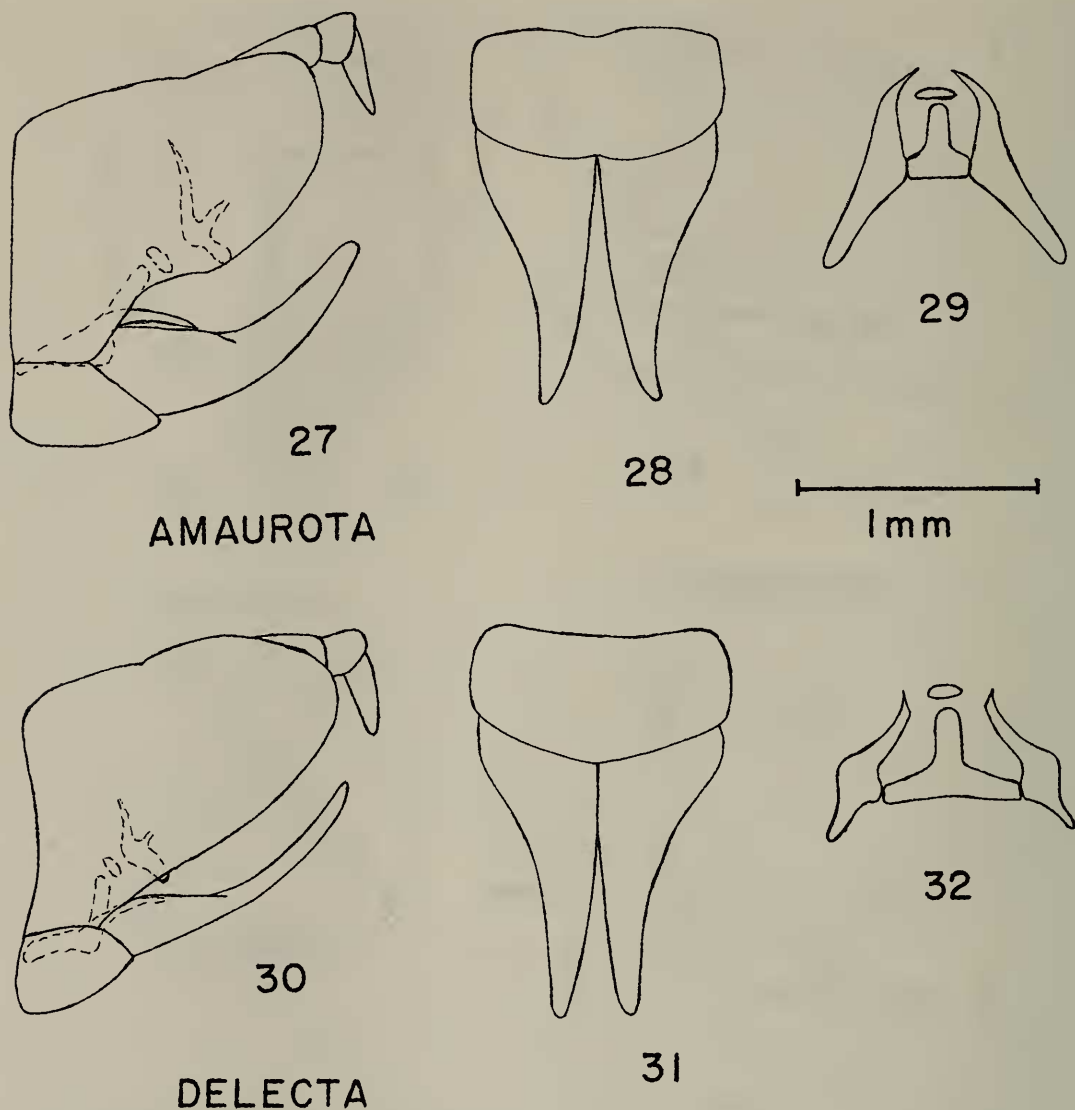


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Figures 21-26. Figures 21-23. *Neohadria diversa* n. sp. Fig. 21. Male genital capsule, lateral view, setae not shown. Fig. 22. Male valve and subgenital plates, ventral view, setae not shown. Fig. 23. Male styles, connective and paraphysis, ventral view. Figures 24-26. *Neohadria grisea* n. sp. Fig. 24. Male genital capsule, lateral view, setae not shown. Fig. 25. Male valve and subgenital plates, ventral view, setae not shown. Fig. 26. Male styles, connective and paraphysis, ventral view. All drawn to the same scale.



Figures 27-32. Figures 27-29. *Neohadria amaurota* n. sp. Fig. 27. Male genital capsule, lateral view, setae not shown. Fig. 28. Male valve and subgenital plates, ventral view, setae not shown. Fig. 29. Male styles, connective and paraphysis, ventral view. Figures 30-32. *Neohadria delecta* n. sp. Fig. 30. Male genital capsule, lateral view, setae not shown. Fig. 31. Male valve and subgenital plates, ventral view, setae not shown. Fig. 32. Male styles, connective and paraphysis, ventral view. All drawn to the same scale.

Key to the species of *Neohadria*

1. Male subgenital plates smaller and triangular (Figs. 14, 28, 31)..... 2
- 1'. Male subgenital plates larger and rounded (Figs. 22, 25).....4

2. Dorsal part of head and pronotum black with many small yellow spots (Fig. 6).....*amaurota* n. sp.
- 2'. Dorsal part of head and pronotum mostly green or gray3

3. Head and pronotum green with randomly spaced dark spots (Fig. 3)
*maculata* n. sp.
- 3'. Head and pronotum gray with irregular dark spots and a prominent horizontal line anterior to ocelli (Fig. 15)
*delecta* n. sp.
4. Male styles large, evenly curving to a sharp apex (Fig. 23) *diversa* n. sp.
- 4'. Male styles small, curving to near apex which is slanted (Fig. 26).....
*grisea* n. sp.

***Neohadria maculata* Freytag NEW SPECIES**

(Figures 3, 12-14 and 20)

Description: Length of male 6.4-7 mm, female 6.5-7.5 mm. Head yellow with dark brown markings (Fig. 3). Pronotum yellow, except for posterior margin and much of median, green, with brown markings (Fig. 3). Forewings green with brown veins and numerous small brown spots in most cells, first and most of second apical cells, membranous; third apical cell with small dark brown spot near apex (Fig. 4). Legs yellow. Abdomen mostly yellow ventrally, reddish brown dorsally. Male genitalia: Pygofer broadly rounded at apex (Fig. 12). Subgenital plates triangular, gradually narrowing to rounded apex (Fig. 14), about three-fourths length of pygofer. Aedeagus (Fig. 12) short, stout with truncate apex. Style (Fig. 13) robust at base narrowing to apex which is angled, pointed. Connective (Fig. 13) T-shaped, short. Paraphysis vestigial, represented by a small sclerite. Female seventh sternum (Fig. 20) robust, posterior margin rounded to a small pointed median projection .

Type Data: Holotype male: Dominican Republic, Barahona, Eastern Sierra Bahoruco, Reserva Cachote, 12.8 km NE Paraiso, 18-05-52N 71-11-19W, 1198 m., 21-23-III-2004, J. Rawlins, C. Young, R. Davidson, C. Nunez, M. Rial, semi-disturbed wet broadleaf, UV light, Sample 44313, specimen 364,226 (CMNH). Paratypes: Nine males, three females, same data as holotype, except for specimen number (5 males, 1 female, CMNH; 2 males, 1 female, FSCA; 2 males, 1 female, UKYL).

Additional Specimens: Over 400 specimens of this species have been seen from Barahona and Independencia (CMNH, FSCA). Some 150 specimens from other areas including Puerto Plata, Pedernales, Santiago, Elias Piña, Duarte, La Vega, San Christóbal and Distrito Nacional (CMNH, FSCA, MHND, UKYL, USNM).

Remarks: At this time this is the most common species in this genus. It somewhat resembles *Hadria cubana*, but can easily be separated by having but one anteapical cell in the forewing, and quite different male and female genitalia.

***Neohadria diversa* Freytag NEW SPECIES**

(Figures 5, 19 and 21-23)

Body: Length of males 7.5-8 mm, females 8.2-8.5 mm. Head yellow, with

black irregular markings from ocelli back to posterior margin (Fig. 5), eyes reddish brown. Pronotum and scutellum with many black irregular markings (Fig. 5). Forewings yellowish green, covered with many black irregular markings, except first and over half of second apical cells, membranous. Legs yellow orange. Abdomen mostly yellow ventrally, dark brown dorsally with band of reddish orange between each segment.

Male genitalia: Pygofer (Fig. 21) narrowing to a truncate apex. Subgenital plates (Fig. 22) robust, rounded then narrowed to rounded apex. Aedeagus (Fig. 21) simple, long, finger-like. Style (Fig. 23) large, crescent-shaped, sharply pointed at apex. Connective (Fig. 23) T-shaped, with short shaft. Paraphysis vestigial, represented by a small sclerite. Female seventh sternum (Fig. 19) robust, posterior margin rounded on each side of convex area each side of small pointed median projection.

Type Data: Holotype male: Dominican Republic, Independencia, Sierra de Neiba near crest, 5.5 km NNW Angel Feliz, 18-41N 71-47W, 1750 m., 21-22-VII-1992, J. Rawlins, S. Thompson, C. Young, R. Davidson, Dense Cloud Forest (CMNH). Paratypes: Two males, same data as holotype (1 male, CMNH; 1 male FSCA).

Additional Specimens: One male, two females, similar data to holotype, except south slope near summit, 4.1 km N Angel Feliz, 18-40-24N 71-46-04W, 1851 m., 1-2-IV-2004, canopy trap, sample 34193 (CMNH); 4 males, same, except sample 34113 (CMNH); 3 males, 5 females, same, except sample 34243 (CMNH); 13 males, 6 females, same, except sample 34213 (9 males, 2 females CMNH; 2 males, 2 females FSCA; 2 males, 2 females UKYL); 1 male, same, except sample 34283 (CMNH); 1 male, same, except sample 34263 (CMNH).

Remarks: This species is related to *maculata* but with a different color pattern and male genitalia.

Neohadria amaurota Freytag NEW SPECIES

(Figures 6 and 27-29)

Body: Length of males 7-7.5 mm, females unknown. Head, pronotum and scutellum blackish brown with yellow spots (Fig. 6). Face uniformly black, eyes reddish orange. Forewings blackish brown with numerous small grayish spots overall, except for membranous first and apical half of second apical cells. Legs orange red. Abdomen blackish brown with orange red membranous areas.

Male genitalia: Pygofer (Fig. 27) robust, with a truncate apex. Subgenital plates (Fig. 28) triangular, narrowing to a nearly pointed apex. Aedeagus (Fig. 27) small, short, truncate. Style (Fig. 29) gradually narrowing to a pointed apex. Connective (Fig. 29) small, with lateral arms short. Paraphysis vestigial, represented by small sclerite.

Type Data: Holotype male: Dominican Republic, Independencia, Sierra de Bahoruco, Loma del Toro, 5.3 km SW El Aguacate, 18-17-16 N 71-42-46 W, 2316 m., 29-30-III-2004, C. Young, R. Davidson, J. Rawlings, Pinus, Garrya

montane forest, Malaise trap, sample 43283, specimen # CMNH 364,337 (CMNH). Paratypes: Three males, same data as holotype, except specimen # 362,977, 363,194 and 364,345 (one in each CMNH, FSCA and UKYL).

Remarks: This species has a unique color pattern which separates it from the other species of the genus.

***Neohadria delecta* Freytag NEW SPECIES**

(Figures 15-16 and 30-32)

Body: Length of males 6.8-7.1 mm, females 7.3-7.5 mm. Head yellow, marked with blackish brown (Fig. 15). Face yellow with faint brown markings overall. Pronotum and scutellum yellow, with brown markings (Fig. 15). Forewings greenish yellow, with first and second apical cells membranous, and two dark brown spots, one in base of anteapical cell, other at apex of third apical cell. Legs yellow. Abdomen yellow ventrally, red dorsally.

Male genitalia: Pygofer (Fig. 30) gradually narrowed to rounded apex. Subgenital plates (Fig. 31) triangular, narrow, elongate, extending nearly to apex of pygofer. Aedeagus (Fig. 31) short, stubby. Style (Fig. 32) with a stout base, narrowing to bent, sharply pointed apex. Connective (Fig. 32) T-shaped. Paraphysis vestigial, represented by small sclerite. Female seventh sternum (Fig. 16) robust, posterior margin angled to a small pointed median projection.

Type Data: Holotype male: Dominican Republic, Barahona, Filipinas, Larimar Mine, 1006 m., 12-IV-1997, blacklight trap, R. E. Woodruff (FSCA). Paratypes: Ten males, two females, same data as holotype (6 males, 1 female FSCA; 2 males, 1 female CMNH; 2 males UKYL).

Additional Specimens: Six males, one female, same data as holotype, except at light, 16-17-XII-1995 (FSCA); 1 male, 1 female, same data as holotype, except mercury vapor light, 6-11-VII-1993 (FSCA); 1 male, Barahona, Eastern Sierra Bahoruco, Reserva Cachote, 12.8 km NE Paraiso, 18-05-52N 71-11-19W, 1198 m., 22-23-XI-2004, J. Rawlins, V. Verdecia, C. Young, C. Nunez, W. Zanol, semi-disturbed wet broadleaf, UV light, sample 44315, specimen 383,217 (CMNH).

Remarks: This species is closely related to *maculata* with a different color pattern and different male genitalia.

***Neohadria grisea* Freytag NEW SPECIES**

(Figures 17-18 and 24-26)

Body: Length of males 6.4-7.1 mm, females 7.3-7.5 mm. Head, pronotum and scutellum grayish yellow, with numerous brown markings (Fig. 17). Forewings grayish yellow, with brown veins, brown modeling overall, with first and second apical cells, membranous. Legs grayish yellow. Abdomen grayish yellow ventrally, reddish brown dorsally.

Male genitalia: Pygofer (Fig. 24) narrowing to rounded apex. Subgenital plates (Fig. 25) robust, with stubby rounded apex. Aedeagus (Fig. 24) small,

short, truncate. Style (Fig. 26) with robust base, narrowing to slanted, sharply pointed apex. Connective (Fig. 26) T-shaped, with shaft same length as arms. Paraphysis vestigial, represented by a small sclerite. Female seventh sternum (Fig. 18) robust, truncate, with sharply pointed median projection.

Type Data: Holotype male: Dominican Republic, Barahona, Filipinas, Larimar Mine, 1006 m., 12-IV-1997, blacklight trap, R. E. Woodruff (FSCA). Paratypes: 9 males, 6 females, same data as holotype (5 males, 2 females FSCA; 2 males, 2 females CMNH; 2 males, 2 females UKYL).

Additional Specimens: One male, Dominican Republic: Barahona, Eastern Sierra Bahoruco, Reserva Cachote, 12.8 km NE Paraiso, 18-05-54N 71-11-21W, 1230 m., 21-23-III-2004, J. Rawlins, C. Young, R. Davidson, C. Nunez, M. Rial, cloud forest with tree ferns, Malaise trap, sample 44283 (CMNH); one female, Independencia, Sierra de Neiba just south of crest, 5 km NW Angel Feliz, 1780 m., 18-41N 71-47W, 13-15-X-1991, J. Rawlins, R. Davidson, C. Young, S. Thompson, cloud forest (CMNH); one male, two females, Independencia, Sierra de Neiba south slope near summit, 4.0 km N Angel Feliz, 18-40-21N 71-46-05W, 1825 m., 1-2-IV-2004, J. Rawlins, C. Young, R. Davidson, broadleaf cloud forest without pine, UV light, sample 34213 (CMNH); one female, same data, except 18-40-17N 71-46-03W, 1821 m., disturbed cloud forest with fields, sample 34313 (CMNH); one female, La Vega, Cordillera Central, Loma Casabito, 15.4 km NW Bonao, 19-02-00N 70-30-58W, 1385 m., 28-V-2003, J. Rawlins, C. Young, R. Davidson, C. Nunez, P. Acevedo, disturbed evergreen cloud forest, UV light, sample 21312 (CMNH); one male, similar data to last, except 15.8 km NW Bonao, 19-02-12N 70-31-08W, 1455 m., sample 21212 (CMNH); one female, similar data as last, except 19-03N 70-31W, 1390 m., 3-XI-2002, V. A. Zanol, C. W. Young, C. Staresinie, J. Rawlins, wet cloud forest, sample 24119 (CMNH).

Remarks: This species is related to *maculata*, but is gray in color and has different male genitalia.

ACKNOWLEDGMENTS

Many thanks are extended to Dr. Chen Young, Carnegie Museum of Natural History and Dr. Robert E. Woodruff, Florida State Collection of Arthropods for making the specimens available for this study.

LITERATURE CITED

- Diabola, J. and N. Novoa.** 1976a. Dos Nuevas Especies del Género *Hadria* Metcalf y Bruner, 1936 (Homoptera: Auchenorrhyncha) y Revisión de Otras Especies Cubanas. Poeyana 157: 1-17.
- Diabola, J. and N. Novoa.** 1976b. Dos Nuevas Especies del género *Arezzia* Metcalf y Bruner, 1936 (Homoptera: Auchenorrhyncha) y Revisión de Otras Especies Cubanas. Poeyana 158: 1-27.
- Young, D. A.** 1977. Taxonomic study of the Cicadellinae (Homoptera: Cicadellidae). Part 2. New World Cicadellini and the genus *Cicadella*. North Carolina Agricultural Experiment Station Bulletin 239. 1135 pp.